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Standards POCs' Top 10 Design Errors and/or Issues Observed

RECORD OF REVISION

Rev. No.	Date	Description
0	5/27/04	Initial Issue.
1	8/4/04	Added Chapter 1.
2	2/2/05	Organization changes.

NOTE: Please contact the listed Engineering Standards POC for questions.
http://engstandards.lanl.gov/engrman/HTML/poc_techcom1.htm

The Standards Homepage: http://engstandards.lanl.gov

This document was developed as an aid to the outside AEs (architect/engineers) since they perform the majority of design work for LANL. It cites the design errors are seen most frequently in their design output submittals.

Because LANL personnel are likely to commit some of the same errors, they will also benefit from studying this document.

Ch. 1, General Design Errors and/or Issues

1. Overlooking Chapter 1 of the ESM – it has technical requirements that apply to all disciplines.
2. Not following Section Z10 of ESM Chapter 1, especially requirements on design output submittals, Master Equipment List development by AE, and required specification practices.
3. Not following Sections 210-230 of ESM Chapter 1; these set out requirements for component numbering.

ESM Chapter 1, General POC – Tobin Oruch, ENG-DO

Ch. 2, Fire Protection Design Errors and/or Issues

1. Code analysis must be complete – Some examples of problems: codes of record are not identified, or codes of record are incorrect, or codes of record are listed with incorrect version dates; allowable travel distances/dead ends/common paths of travel are exceeded by design as presented; egress paths required to be fire rated are not shown as fire rated. [Basis: NFPA 101]
2. AEs should not show too many details with regard to fire protection system design. The subs are better at designing to the required codes than the AEs are, and LANL wants only what is code-required or additions specifically requested by FIRE. [Basis: NFPA 13, NFPA 72, and other applicable NFPA codes.] Examples:
    - Showing too many fire alarm devices in a space [Basis: NFPA 72 is applicable code, too many or too few devices identified by AE means the subcontractor bids the job wrong]
    - Showing separate control valves for first floor and second floor sprinklers (2 story building) [LANL standard practice is to NOT have the ability to isolate each floor separately]
3. AEs should not omit details called out in LANL Engineering Standards and Construction Specifications. Examples:
    - Not showing the two OS&Y valves on the required sprinkler riser backflow preventer [LANL standard]
    - Not showing an isolation valve for elevator shaft sprinklers [LANL standard]
4. Provide only the fire protection required by code and any additions that are specifically requested by FIRE. Example: Providing smoke detectors or heat detectors in fully sprinklered facilities that do not require the detectors. [Basis: NFPA 13, NFPA 72, and other applicable NFPA codes.]
5. When LANL Subject Matter Experts (SMEs) make comments on project documents (specifically via DRR), each comment must be provided with a response. Where there is a question on how to address the comments, the SME should be consulted. In some cases, even when a comment is addressed, it is inappropriately addressed. [Basis: Good project practice.] [Project Management Division Facilities Project Delivery Group, Procedure 701, Control, Review, and Approval of Contractor Submittals, Rev 1, March 1998]
6. When AEs answer RFIs, LANL counterparts should be notified of decisions that will affect their areas of expertise for the project. The ability to review all project RFIs and associated responses would be helpful. [Basis: Project Management Division Facilities Project Delivery Group, Procedure 701, Control, Review, and Approval of Contractor Submittals, Rev 1, March 1998]
7. HVAC design must include all required fire dampers, duct detection. HVAC design must not include fire dampers or duct detection that is not needed. [Basis: NFPA 90A, NFPA 75, NFPA 72]
8. Identify proper fire rating for walls/floors/ceilings, ex. elevator shafts, elevator machine rooms. Show required fire ratings of walls within buildings per LANL Drafting Manual. [Basis: Building code, NFPA]
9. Follow appropriate occupancy-specific codes, like NFPA 45 for laboratories, NFPA 75 provisions for computer rooms, or NFPA 232 provisions for records vaults.
10. Follow DOE standards for size, location, valving, and arrangement of underground fire protection mains. [Basis: DOE Std 1066]

ESM Chapter 2, Fire Protection POC – Julie Wood, FIRE

Ch. 3, Civil Design Errors and/or Issues

1. Underground designs/profiles for gravity lines done w/o pothole determination of exact location of existing substructure [very costly mistakes].
2. Lack of concern for the most workable cost effective solution.
3. Failure to make field trips/ actual on-site reviews.
4. Putting detail/or standard details on a single sheet and probably charging for it.
5. Estimates not reflecting the Los Alamos environment.
6. Miscommunication and uncoordinated drawings within the same company.
7. Invalid/outdated survey data.
8. Expensive overhead for design.
9. Not thorough with utility research.
10. Lack of field experience.

ESM Chapter 3, Civil POC – Ed Hoth, NWIS-Utilities

Ch. 4, Architectural Design Errors and/or Issues

1. ADA requirements not incorporated; clearance around doors, cabinets, equipment mounting height, shower controls, projections into spaces such as palm/badge readers, site development elements such as sidewalks. (Basis: ESM Chapter 4. B-C GEN 3.6)
2. Toilet fixture counts meeting user's needs-vs-code minimum. Ch 4 revision is fixing this (if followed). (Basis: Future ESM Chapter 4. C Interiors, UPC, Good Architectural Practice)
3. Parapet heights for safe roof and equipment inspections. Ch 4 revision is fixing this (if followed). (Basis: Future ESM Chapter 4.B Shell, OSHA, Good Architectural Practice)
4. Emergency egress doors with stoops and no hard surface to allow you to move away from the structure to a public right of way. (Basis: Good Architectural Practice)
5. Site analysis leading to appropriate levels of development not being achieved – i.e. sidewalks provided by the project that accommodate existing pedestrian traffic to, through and from the site, etc. (Basis: Good Architectural Practice)
6. Architectural and Structural drawings that are not coordinated - bearing heights and floor level height are sometimes several feet off. (Basis: ESM Drafting Manual, Good Architectural Practice)
7. Wall sections tend to be drawn to show generality instead of specifics. Several drawings have shown insulation at the wrong height and the bearing is shown at the wrong height. (Basis: ESM Drafting Manual, Good Architectural Practice)
8. Keyed notes that are not used but still listed on the sheet. These should be marked as "NOT USED" or edit entire list for project. (Basis: ESM Drafting Manual, Good Architectural Practice)
9. Scuppers shown over windows, vents or doors. (Basis: Good Architectural Practice)
10. Roof drains draining to low areas of the site. (Basis: Good Architectural Practice)
11. On several projects more detail has been requested on connections or finishes and the reply was that this is not in their scope because it is a design/build project and additional detailing is not required. (Basis: Contractual, Good Architectural Practice)
12. Code Analysis are not created early enough in the projects, usually done for 90% design review because we requested it at 60%. (Basis: ESM Drafting Manual, Good Architectural Practice)
13. Electrical and Mechanical rooms that are required to be climate controlled but the walls do not extend to the structure above or are not scheduled to have a ceiling. (Basis: ESM Chapters 6 & 7)
14. LANL supplies the A/Es with Design Performance Specifications; the A/Es then make copies and insert these into the construction specifications instead of down loading the LANL construction specifications from the WEB site with project specific editing. (Basis: ESM Chapter 1 etal)
15. Room numbers are not consistent through-out the set of drawings (or per ESM - Ch 4 revision is fixing this (if followed)). (Basis: Future ESM Chapter 4,C-Interiors C1030.3.0)
16. Entrance storefronts are almost always shown with full height glazing instead of showing a mullion at 36" to decrease the cost of replacement or someone going through the glazing. Ch 4 revision is fixing this (if followed). (Basis: Good Architectural Practice)
17. Some projects have used hospital door frames instead of regular welded frames (standards noncompliance). (Basis: ESM Construction Spec 08114)
18. Perimeter insulation is not always specified because out of state A/Es don't reference the New Mexico Energy Code. (Basis: WSS, ESM)

ESM Chapter 4, Architectural POC – Scott Richardson, PM-1

Ch. 5, Structural Design Errors and/or Issues

1. A/Es don't read & abide by LANL ESM Chapter 5. There are many LANL-specific requirements in Ch. 5 that get overlooked. Example:
    - use of site-specific ground motion values, vs. those given in building code, when calculating earthquake loads
    - correction for air density above 7,000 ft when calculating wind loads
    - geotechnical investigation completed & submitted with project package / records
2. LANL Master Specification sections are copied verbatim. This specification is intended to be a guide that the A/E must tailor to meet the needs of a specific project. Same goes for LANL standard details.
3. Items designed in calculations do not appear in construction drawing details (or appear differently), & vice-versa (e.g., anchor bolts, welds, concrete reinforcing steel, etc.).
4. Construction drawings reference details that aren't provided, or are provided, but mislabeled.
5. The project package is incomplete (e.g., the construction drawings arrive w/o calcs, etc.).
6. ENG-DECS' review comments are not responded to / incorporated.
7. ENG-DECS is told that comments have been incorporated; however, new drawings / specs / calcs are not presented as proof.
8. ENG-DECS gets asked to review 100% project package without having seen packages at previous review stages.
9. ENG-DECS doesn't get Design Review Record document back with the answers to their comments on it.
10. The ESM Standards requires more extensive detailing for PC-2 and higher facilities than the building codes. This requirement is seldom adhered to.

ESM Structural Chapter POC – Michael Salmon, ENG-DECS

Ch. 6, Mechanical Design Errors and/or Issues

1. Using other than LANL established Design Climate data in their load calculations. (Basis: ESM Chapter 6)
2. Apply the correction and safety factors for motor brake horsepower as shown in Spec #16225. (Basis: ESM Chapter 6)
3. Provide three way or 2-way minimum flow valves at the end of hot water heat piping systems. (Basis: ESM Chapter 6)
4. Provide and additional 15% cooling capacity in large building HVAC systems. (Basis: Specification 15100 Design Build Specs)
5. Provide B&G circuit setters for VAV hot water coils. (Basis: ESM Chapter 6)
6. Provide entire system ductwork calculation and not just the assumed worst case route. (Basis: Good Practice)
7. Provide an ASHRAE 62 calculation to ensure compliance in maintaining CO. (Basis: ESM Chapter 6)
8. Provide heating hot water boiler controls with water temperature reset using burner controls rather than controlling with a three way valve bypass loop at the boiler. (Basis: ESM Chapter 6)
9. Providing adequate service space around equipment in the mechanical room. (Basis: ESM Chapter 6)
10. Placing VAVs outside the office space. (Basis: ESM Chapter 6)
11. Providing riser diagrams for each plumbing system. (Basis: Drafting Manual)
12. Not using the LANL required 2.25 inches of rainfall in an hour period. (Basis: ESM Chapter 6)
13. Not providing a re-circulation pump to prevent freezing in a coil that is exposed to freezing outside air. (Basis: ESM Chapter 6)
14. Not providing an Energy Conservation Report. (Basis: ESM Chapter 6)
15. Not providing the vibration and sound attenuation calculation for systems. (Basis: Test and Balance Specification)
16. Providing an ASME stamped expansion tank on systems above 15 psi. (Basis: ESM Chapter 6)
17. Providing a separate 24/7 HVAC unit to server & communication rooms. (Basis: ESM Chapter 6)
18. Provide a steam drip pan elbow safety relief valve from steam boilers. (Basis: ESM Chapter 6)
19. Provide low ambient controls for units operating year around. (Basis: ESM Chapter 6)
20. Following requirements for building thermostatic zones called out in ESM. (Basis: ESM Chapter 6)
21. Do not use building relief dampers in lieu of a return fan in buildings that occupy humans. (Basis: ESM Chapter 6)
22. Properly heating mechanical rooms for possible winter shut down. (Basis: ESM Chapter 6)
23. Do not select powered equipment (fans, pumps, etc.) on the flat part of the curve. (Basis: Good Practice)

Ch. 7, Electrical Design Errors and/or Issues

1. Service load analysis not provided on one-line diagram sheet. (Basis: ESM Chapter 7 Section D5000 §4.2-F.7 and Drawing ST-D5000-2.)
2. Grounding diagram conductor sizing left to the electrician. (Basis: ESM Chapter 7 Section D5000 §4.2-F.7 and "designer note" on Drawing ST-D5010-1.)
3. No design analysis with calculations (i.e. method, assumptions, input data, conclusions). (Basis: ESM Chapter 7 Section D5000 §4.1.)
4. Equipment on electrical plans does not match mechanical equipment schedule. (Design organization inter-discipline coordination and QA issue.)
5. 120 volt branch circuits significantly longer than 100 ft. (Basis: ESM Chapter 7 Section D5000 §6.2-D and Section D5010 §2.7.1)
6. Electrical equipment not located in dedicated electrical equipment rooms or spaces. (Basis: ESM Chapter 7 Section D5000 §7.1-D.)
7. Ballast factor not included in lighting calculations. (Basis: ESM Chapter 7 Section D5020 §6.2-D and IESNA Lighting Handbook Chapter 9 pages 18 and 19.)
8. Multiple panel boards tapped to transformer secondary resulting in installation that is difficult to make and maintain. (Example of how a design may satisfy the NEC but still is not constructable or maintainable.)
9. Equipment misnamed, particularly LP vs. PP. (Basis: ESM Chapter 1 Section 230 and NEC Section 408.14.)
10. Steel vs. concrete structure confusion on grounding diagram. (Basis: ESM Chapter 7 Section D5000 §4.2-F.7 and Drawing ST-D5010-1.)

Other Contenders:

- Lack of selective coordination actually demonstrated by coordination study.
- Adjacent outlet boxes not aligned.
- Use of demand factors other than those specifically permitted by NEC.
- Lack of working clearance about electrical equipment.
- Not knowing difference between NEC Articles 280 and 285 (surge arresters and TVSSs)
- Locating exterior electrical equipment so it ends up in standing water, buried in snow, or under falling ice.
- Meter cabinet not shown on Drawings.
- Lightning protection air terminals spaced more than 20 ft.
- Referencing obsolete equipment catalog numbers.
- Design doesn't match performance criteria or F&OR.
- No grounding diagram provided.
- Specifications not edited to suit project requirements.
- Cable tray access not provided/detailed.
- Telecommunications rooms distant from electrical rooms.
- Inadequate fire separation between structures and oil-filled transformers.
- Inadequate access to pad mounted transformers.

Ch. 8, Instrumentation & Controls Design Errors and/or Issues

1. Equipment spaces are not adequately planned before the foundation plan is finalized, resulting in mechanical rooms that are too small or poorly arranged. This affects every discipline. In cramped mechanical rooms we have found control panels located beneath pressure reducing stations and in hot corners behind boilers. (Basis: Good engineering practice.)
2. Incorrect balancing valves used. The control system can never work adequately if the air and hydronic balance is not correct. (Basis: Standard Specification 15180, Section 2.13)
3. Inadequate design for AHU coil freeze protection. (Basis: Standard Drawing ST-D30GEN-2)
4. Lack of freeze protection for units with DX cooling (required to protect the water systems in the building including hot water reheat coils). (Basis: ESM Chapter 6, Section 10.0)
5. Major equipment does not communicate with the building automation system (BAS). (Basis: Standard Specification 15900 Section 1.1)
6. Sequence of operation is vague or non-existent for some systems. (Basis: Contractor shall implement sequences in Contract Documents per Standard Specification 15900 Section 3.6.D.)
7. Sequence of operations cannot be implemented by selected hardware (sequence calls for boiler supply temperature reset, but selected boiler does not have this option). (Basis: Contractor shall implement sequences in Contract Documents per Standard Specification 15900 Section 3.6.D.)
8. Electrical power for BAS is not supplied from dedicated circuits. (Basis: Standard Specification 15900 Section 2.37.B.)
9. Poor sensor placement (ex: building static reference in high turbulence area, room temp sensors not coordinated with furniture, etc.). (Basis: Good engineering practice)
10. Inadequate heating or cooling capacity at the zone level, resulting from poor definition of, or adherence to, the load requirements in the F&Ors. (Basis: Good engineering practice)

ESM Chapter 8, I&C POC – Mel Burnett, ENG-DECS

Ch. 9, Security Design Errors and/or Issues

None at this time.

Ch. 10, Hazardous Process Design Errors and/or Issues

1. Lack of Formality in Approach.
   a. Designer may need to ask for and early on get good, written design input from LANL (F&OR or equivalent) – and ensure design input is maintained consistent with decisions/changes.
   b. This includes early & iterative coordination with hazards analysis.

      Basis: ESM Ch 10 Sections 3.1.A & B pointing to Ch12 Sect 3.0 and 4.0
2. Designer needs to develop and maintain design basis documents – criteria, codes, standards, studies, decisions that shape the design
   a. Should start FDD and SDDs early and maintain as part of this, not as afterthought by those not involved.
3. Startup and testing (integrated or not)
   a. Requirements not thought out early and spelled-out and costed.

      Basis: ASME AG-1, AIHA/ANSI Z9.5, and good engineering practice
4. Inadequate Independent verification and validation of design
   a. AE should help LANL identify where to do this

      Basis: ESM Ch 1 Section Z10-Z1020 QA Requirements

ESM Chapter 10, Hazardous Process POC – Tobin Oruch, ENG-DO

Ch. 11, Radiation Protection Design Errors and/or Issues

The following items are the most common radiological design issues with A/E subcontractors when dealing with design of new or modification of existing facilities or operations:

1. The lack of operational health physics knowledge to incorporate appropriate design and floor plan, flow of personnel and material.

   Basis: ESM, Chapter 11, F1030.2, Section 3.1 C Qualified Radiological Engineer. Good engineering practice.

2. Inappropriate or inadequate assumptions for operations, process and radiation source-term.

   Basis: Appendix A, ESM, Chapter 11, F1030.2:
   Section 5.0 Radiological Condition,
   Section 6.0 Facility/Operation Layout,
   Section 8.0 Maintenance and Operations,
   Section 9.0 Shielding and Dose Rate Determination,
   Section 15.0 Ventilation, and
   Good engineering practice

3. Inappropriate radiological source term – isotopic composition, photon and neutron spectrum to include (α, n) reaction.

   Basis: Appendix A, ESM, Chapter 11, F1030.2:
   Section 5.0 Radiological Condition
   Section 9.0 Shielding and Dose Rate Determination, and
   Good engineering practice

4. Lack of documentation of assumptions used in analysis.

   Basis: Appendix A, ESM, Chapter 11, F1030.2: Section 9.0, Shielding and Dose Rate Determination, and Good engineering practice

5. Inappropriate computational methodology, models, computational software codes, and hand calculations for shielding and dose analysis.

   Basis: Appendix A, ESM, Chapter 11, F1030.2: Section 9.0, Shielding and Dose Rate Determination, and Good engineering practice

6. Inappropriate design dose limits and dose rates used to determine shielding design features.

   Basis: ESM, Chapter 11, F1030.2: Section 3.2 Radiological Design Regulatory Requirements, and Good engineering practice

7. Inadequate change room layout to manage controlled and uncontrolled commingling.

   Basis: Appendix A, ESM, Chapter 11, F1030.2:
   Section 4.0 Radiological Design Scope
   Section 6.0 Facility/Operation Layout
   Section 10.0 Contamination Control, and
   Good engineering practice

8. Inappropriate fluence to dose conversion factors used in analysis

   Basis: ESM, Chapter 11, F1030.2: Section 3.2 Radiological Design Regulatory Requirements (L.), and
   Appendix A, ESM, Chapter 11, F1030.2: Section 9.0, Shielding and Dose Rate Determination, and Good engineering practice

9. Inadequate sampling and contamination control design features

   Basis: ESM, Chapter 11, F1030.2: Section 3.2 Radiological Design Regulatory Requirements (A., E., F., H., I., M., N., Q)
   Appendix A, ESM, Chapter 11, F1030.2:
   Section 10.0 Contamination Control,
   Section 12.0 Liquid Systems (Tanks, Pumps, Sumps, and Slurry Systems),
   Section 13.0 Piping,
   Section 14.0 Instrumentation,
   Section 15.0 Ventilation,
   Section 16.0 Filters and Demineralizers, and Good engineering practice

10. Poor or lacking a Radiological and ALARA Design Plan.

    Basis: Appendix A, ESM, Chapter 11, F1030.2: Section 3.0 ALARA and Radiological Design Plan, and Good engineering practice

11. Poor documentation of engineering controls and justification why administrative controls were considered when engineering controls were deemed impractical.

    Basis: ESM, Chapter 11, F1030.2: Section 3.2 Radiological Design Regulatory Requirements (A.)
    Appendix A, ESM, Chapter 11, F1030.2: Section 3.0 ALARA and Radiological Plan, and Good engineering practice

12. Poor integration of radiological design features and structure in the entire design.

    Basis: Appendix A, ESM, Chapter 11, F1030.2:
    Section 6.0 Facility/Operation Layout,
    Section 8.0 Maintenance and Operations
    Section 9.0 Shielding and Dose rate Determination
    Section 10.0 Contamination Control,
    Section 11.0 Access Control
    Section 12.0 Liquid Systems (Tanks, Pumps, Sumps, and Slurry Systems),
    Section 13.0 Piping,
    Section 14.0 Instrumentation,
    Section 15.0 Ventilation,
    Section 16.0 Filters and Demineralizers,
    Section 17.0 Implementation or Modification Design Considerations
    Section 19.0 Waste Minimization, and
    Good engineering practice

ESM Chapter 11, Radiation Protection POC – Bill Eisele, HSR-12. Alternate: Jim Bland

Ch. 12, Nuclear Design Errors and/or Issues

1. Lack of Formality in Approach [Basis: ESM Ch 10 Sections 3.1.A & B pointing to Ch12 Sect 3.0 and 4.0]
    - Designer may need to ask for and early on get good, written design input from LANL (F&OR or equivalent) – and ensure design input is maintained consistent with decisions/changes.
    - This includes early & iterative coordination with hazards analysis.
    - Designer needs to develop and maintain design basis documents – criteria, codes, standards, studies, decisions that shape the design.
    - Should start FDD and SDDs early and maintain as part of this, not as afterthought by those not involved.
2. Startup and testing (integrated or not) [Basis: ASME AG-1, AIHA/ANSI Z9.5, good eng practice]
    - Requirements not thought out early and spelled-out and costed.
3. Inadequate Independent verification and validation of design [Basis: ESM Ch 1 Section Z10-Z1020 QA Requirements]
    - AE should help LANL identify where to do this.
4. Inadequate relevant nuclear design experience in personnel (e.g., commercial nuclear, IEEE nuc stds, etc) [Basis: good engineering practice]
5. Inadequate designer interaction with safety analysts [Basis: ESM Ch 12 Sect 5.1.F, etc.]
    - Designer needs to iterate with PDSA team to identify ML-2 systems important to worker safety, not just those directly related to design basis accidents.
    - Designer needs to work with them to determine ML levels down to component levels, not stop at system level, and document in MEL.

ESM Chapter 12, Nuclear POC – Tobin Oruch, ENG-DO

Ch. 13, Welding Design Errors and/or Issues

1. Design is incomplete because specifications for welding are incomplete. Various Codes and Standards have multiple levels of welding and fabrication requirements based on Service, Materials, etc. (Basis: ASME Section 1, ASME Section VIII, ANSI B31.3, AWS D1.1, AWWA D-100.) Examples are:
    - ASME Sec. 1 - Boiler vs Non-boiler Piping,
    - ASME Sec. 3 - Nuclear Classes 1, 2, 3, 4,
    - ASME Sec. 8 - Lethal Service, vs. Non Lethal, vs. Material types vs. Fabrication methods,
    - ANSI B31.3 - Service Categories "Normal" - "D" - "M" -"K"
    - AWS D1.1 - Statically Loaded vs. Dynamically loaded vs. Tubular Structures
    - AWWA D-1 - Normal service vs. Appendix "C"
2. Welding symbols incorrect. Example:
    - Fillet size specified is larger than the thickness of the welded member. Weld specified on wrong side like, 2" dia. x 10' long pipe fillet welded from the inside. (Basis: AWS B2.4.)
3. Code or specification is wrong. i.e. - Structural design with ASME specified for welding specification. (Basis: Good Practice)
4. Location, extent, and method of test and inspection not adequately specified. Example –
    - Hydro-test specified with out requirements. (Required length of test, pressure, pressure drop rate, temperature change, etc.)

    (Basis: ASME Section 1, ASME Section VIII, ANSI B31.3, AWS D1.1, AWWA D-100)
5. Require a good bill of materials that clearly identifies if the items are safety class or safety significant, and applicable specifications, and critical characteristics of an item that should be inspected. (Basis: ESM - Good Practice, ASME Section 1, ASME Section VIII, ANSI B31.3, AWS D1.1, AWWA D-100)
6. Design specifies fabrication requirements that are different from inspection requirements. (Basis: ESM Good Practice).
7. Design is specified as welded construction with no detail as to the size, location, type of welds to use. (Basis: ESM Good Practice, ASME Section 1, ASME Section VIII, ANSI B31.3, AWS D1.1, AWWA D-100)
8. Designer specifies welding methods or processes which are unrealistic. Example –
    - Specifying GTAW process on 5/8" thick "Stainless Gloveboxes" (Basis: Good Practice.)

Drafting Manual Design Errors and/or Issues

1. LANL personnel and Design Agencies (A/Es) are not submitting their design packages to ENG's DECS-DCRM central records.(Basis: LANL Drafting Manual Section 202.2.A, Section 215.1)
2. "As-Built" drawings submitted are not accurate, incomplete and do not represent field conditions. (Basis: Drafting Manual Section 103.2, LANL Specifications, LANL Contract Requirements with BUS and PM Division, and Good Engineering and Business Practices)
3. Lack of a concerted effort to coordinate the naming of major electrical and mechanical equipment. (Basis: LANL Drafting Manual Section 102)
4. LANL personnel and design agencies are not researching DCRM central records department for existing drawing information. (Basis: LANL Drafting Manual Section 103.1)
5. Generating new drawings when an ECN or DCP could have been written to revise existing drawings. (Basis: AP-ENG-002 and ENG-003, LANL Drafting Manual Section 101. "C" Priority Drawings, Sketches, Section 202 Table 202-1, item 31)
6. CAD drawing file names are not to standard or any standard. (Basis: LANL Drafting Manual Section 215.1)
7. Submitting 1/2 size drawing sets and not submitting electronic (CD) data to records, per standards. (Basis: LANL Drafting Manual Section 202.20)
8. Incorrect discipline assignment designations in drawing packages. (Basis: LANL Drafting Manual Section 211)
9. Design Built Drawing Sets are not coordinated and have repetitive sheet numbering assignments. (Basis: LANL Drafting Manual Section 102.1, 2.B & 211)
10. Design Agencies expend great effort trying to meet LANL standards while ignoring or missing basic design/drafting principles.(Basis: [Basic] High School Drafting Techniques, National CADD Standards, American Design Drafting Association Basic Drawing Methods, LANL Drafting Manual, Good Engineering Practices, and common sense)
11. Combining different drawing types on the same sheet.(Basis: LANL Drafting Manual Section 211)
12. Combing different disciplines on the same sheet.(Basis: LANL Drafting Manual Section 102.2.E)
13. Incorrect Sheet numbering (Basis: LANL Drafting Manual Section 210 and 211)
14. Drawing packages are not consistent especially between contractors. (Basis: LANL Drafting Manual Sections 101 & 102.2.B)
15. X-Refs are not bound.(Basis: LANL Drafting Manual Section 215.4.F)
16. Drawing data is not purged of unused information.(Basis: LANL Drafting Manual Section 215.4.K)
17. Improper detail, section and elevation protocol and sheet referencing. (Basis: LANL Drafting Manual Section 214)
18. Design development packages are not getting reviewed by FM system engineers and deployed designers. (INTERNAL LANL DISCONNECT) (Basis: ENG technical design review procedures & PM Division)

LANL Drafting Manual POC – Richard A. Trout, ENG-DECS